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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/607,014 | 06/29/2000 | Seung Ho Hong | CU-2258 RJS | 7334 |

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EXAMINER

SCHECHTER, ANDREW M

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2871

DATE MAILED: 05/22/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/607,014

Applicant(s)

HONG ET AL.

Examiner

Andrew Schechter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 August 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 June 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) ✓
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3. ✓
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to because Fig. 10 is a graph on which the units along the horizontal axis are not shown. It appears that the horizontal axis should be labeled " $d\Delta n$ (μm)". Also, Fig. 10 is described as being a graph on which zero reflectance corresponds to the claimed values of the retardation, but $5 \times 550\text{nm}/4 = 688\text{nm}$, while the nearest zero appears to be above 700nm. What accounts for this discrepancy and would a retardation at that zero value be within the scope of these claims? A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to because Fig. 6 shows right-handed light reflecting off a mirror and remaining right-handed light (see also the specification, p. 12, lines 17-20 describing this figure). The examiner is under the impression that mirrors flip the handedness of the reflected light. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Reflective type-fringe field switching mode LCD having liquid crystal retardation $(2n+1)\lambda/4$."

4. The abstract of the disclosure is objected to because it is longer than 150 words. Correction is required. See MPEP § 608.01(b).

Claim Objections

5. Claims 1 and 7 are objected to because of the following informalities: in the second-to-last line of each claim, the phrase " λ is wave of light" should be -- λ is the wavelength of light--. Appropriate correction is required.
6. Claims 8-10 are duplicates of claims 4-6. The examiner assumes that they are intended to depend from claim 7 (or 9) rather than from claim 1 (or 5).
7. Applicant is advised that should claim 7 be found allowable, claim 3 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:
- The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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9. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 7 recite "wherein retardation of the liquid crystal layer is $(2n+1) \lambda/4$ " which is unclear in two ways.

The number n is stated to be a "positive number", yet Fig. 10 shows the reflectance being zero for $n = 0$ as well as $n = 1, 2, 3, \dots$. Does the applicant intend $n = 0, 1, 2, 3, \dots$ or $n = 1, 2, 3, \dots$? For examining purposes, the former is assumed.

The claim recites a liquid crystal retardation in terms of λ , but does not specify what the value of λ is. The examiner sees two ways of interpreting this limitation. First, it is possible to assume that the wavelength is the central value of the visible spectrum, $\lambda = 550 \text{ nm}$ (as in the specification, p. 14, and Fig. 10) so the limitation is that the retardation has values substantially equal to $d\Delta n = 138 \text{ nm}, 413 \text{ nm}, 688 \text{ nm}, 963 \text{ nm}, \dots$ (the first value only if $n=0$ is included). Second, it is possible to assume that λ has a range of values 400 nm to 700 nm (the visible spectrum) and therefore $d\Delta n$ can have any of a range of values: 100nm to 175nm (if $n=0$ is included), 300nm to 525nm, 500nm to 875nm, etc. Noting that the second interpretation would include all retardation values above 300nm, the examiner assumes that the applicant intends the first interpretation. (Alternatively, there are well-known devices in which the liquid crystal thickness, and hence the retardation, vary depending on the color, R, G, B of the filter for each pixel; does the applicant intend λ to be the central wavelengths of the spectrums of individual colors?)

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Shigeno*, U.S. Patent No. 6,147,727.

Shigeno discloses [see Fig. 1, for instance] a reflective-type LCD having a liquid crystal layer which has a $\lambda/4$ retardation [col. 3, line 20], substrates [inherent] with homogeneous alignment layers [3L, 3U], a polarizer [70] disposed on the out side of the substrates, and a reflective plate disclosed on the other side. The operation of the device as shown in Fig. 1 is the normally-white operation shown in the present specification's Figs. 5 and 6. *Shigeno* does not disclose that the device is a fringe-field device with pixel and counter electrodes on the first substrate.

The examiner takes official notice that it is well-known in the art to use a fringe-field arrangement (or in-plane switching arrangement) with pixel and counter electrodes on the same substrate, and it would be obvious to one of ordinary skill to do so, motivated by advantages such as only having to construct electrodes on one of the substrates and obtaining a wide viewing angle. Claim 1 is therefore unpatentable.

12. Claims 1, 2, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kwok*, U.S. Patent No. 6,341,001 in view of *Hiroshi*, U.S. Patent No. 6,323,927.

Kwok discloses [see Fig. 13, for instance] a reflective type LCD where, when the twist angle is zero (hence anti-parallel rubbings, see *Hiroshi* below) and the angle between the polarizer and the rubbing is 45° (as it is for Fig. 13), the appropriate retardation of the liquid crystal layer takes on the values 0.14, 0.41, 0.68, etc (estimating the centers of the contours) which correspond to the $(2n+1) \lambda/4$ retardation of claim 1. *Kwok* discloses the basic details of the structure (polarizer, liquid crystal, reflector, see col. 1, lines 58-60, etc.) but does not disclose the details of the electrodes or alignment layers.

The examiner takes official notice, as above, that this in-plane switching arrangement of electrodes and alignment layers is well-known (as disclosed in *Hiroshi*, especially the alignment layers providing anti-parallel rubbing axes, for example) and would be obvious to one of ordinary skill in the art, motivated as above. Claims 1, 2, 5, and 6 are therefore unpatentable.

The examiner also takes official notice that it is conventional in IPS devices that it is conventional to align the rubbing axes at an angle (between 10° and 85°) to the projection line of the fringe field (as shown in *Hiroshi*, Fig. 1c, for instance). It would be obvious to do so for one of ordinary skill, motivated among other reasons by the desire to use this conventional orientation which allows for good control of the liquid crystal molecules with this electrode arrangement. Claims 3, 7, 9, and 10 are therefore unpatentable.

13. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kwok* in view of *Hiroshi* as applied to claims 1 and 7 above, and further in view of *Mori et al*, U.S. Patent No. 6,184,957.

Claims 4 and 8 recite the polarizer axis coinciding with the rubbing axis rather than being at an angle of 45° to it. As disclosed by *Mori* [col. 8, lines 4-10] for IPS-type devices this is merely the difference between a normally-white and normally-black mode. These are art-recognized equivalents in the field, so it would be within the ability of one of ordinary skill in the art to use a normally-white mode with the axes coinciding. Claims 4 and 8 are therefore unpatentable.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 6,204,904 to *Tillin* discloses having the retarder arrangement have a retardance of $(2n+1) \lambda/4$, and gives examples where this is true of the liquid crystal layer in particular. It also discloses using in-plane switching for the liquid crystal layer, but to the examiner it appears to disclose only using $\lambda/2$ retardation with in-plane switching, so it does not anticipated the present claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (703) 306-5801. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Sikes can be reached on (703) 308-4842. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

AT
Andrew Schechter
May 19, 2002

[Signature]
TOANTON
PRIMARY EXAMINER